STATEMENTS ON ACCOUNTING PRACTICE

No. 2

CONTROL THROUGH MECHANISED ACCOUNTING

Part 1

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AUSTRALIAN SOCIETY OF ACCOUNTANTS

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AUSTRALIAN SOCIETY OF ACCOUNTANTS
(N.S.W. DIVISION)

CONTROL THROUGH MECHANISED ACCOUNTING

Part 1

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The "Silliac" high-speed automatic computer installed July 1956 at the University of Sydney.

The "Silliac" high-speed automatic computer installed July 1956 at the University of Sydney.

PREFACE

THE thanks of the New South Wales Divisional Council and the members of the Society generally are extended to the committee for this initial pamphlet on "Control through Mechanised Accounting."

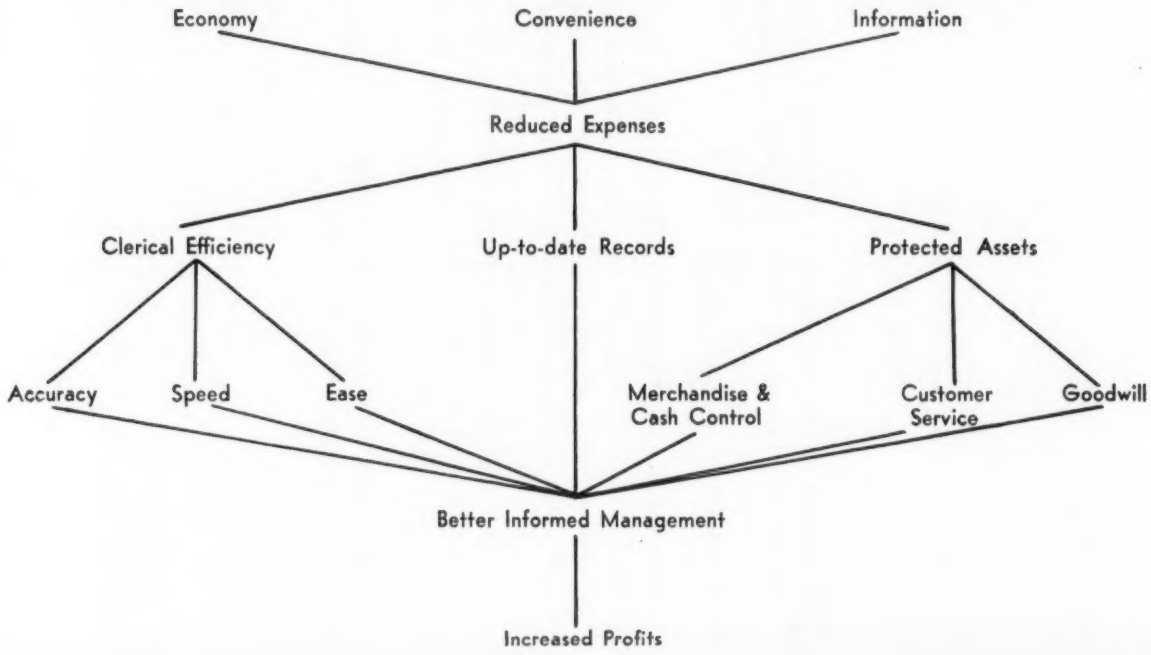
This excellent contribution, following on the publication of the statement entitled "The Preparation of Consolidated Statements" provides evidence of the research activities currently being conducted by study groups of the Society. It is encouraging to note that, in spite of the pressure of their normal business activities, members have been giving so freely of their services in these groups to make the way easier for others.

This is one of the means by which the Society can render a worthwhile service to members.

E. A. CUPIT,

State President.

MANAGERIAL CONTROL THROUGH MECHANISATION CHART



INTRODUCTION

THIS is the first in a series of statements written to help Australian accountants understand what modern mechanised accounting can achieve.

The series will survey available forms of mechanisation and the points to be considered before and during their introduction. They will not tell you how to mechanise your office, but will advise you of the forms of mechanisation available.

The accountant who wants to keep in touch with current thought and practices in mechanised accounting can avail himself of the many books on this subject available in the Society's libraries, while business periodicals and meetings of kindred professional associations also help. The companies selling machines are anxious also to provide literature and advice to help the accountant interested in mechanising any phase of his activities.

The statements are intended to supplement this literature by pointing out the advantages to be gained and the pitfalls to be avoided in mechanisation; and to discuss basic principles. These principles are vital since textbook procedures are unlikely to be suitable for all businesses without adaptation.

Greatest benefit from new equipment will be obtained when choice is made only after exhaustive analysis and adaptation to the specific needs of the business concerned.

Mechanisation Flow Chart

1. DATA ORIGINATING DEVICES.

Type-writers	Accounting Machines	Sales Registers	Adding Machines	Other data originating business machines equipped with paper tape punches

2. INPUT MEDIA.

Paper Tape	Magnetic Tape

3. INPUT DEVICES.

Punched Tape Reader Attached to Console Typewriter	High Speed Paper Tape Reader.

4. DATA PROCESSING.

Control Console	Computer (up to eight)	Magnetic Tape Units*

5. OUTPUT DEVICES.

Tape Punch Attached to Console Typewriter	High Speed Paper Tape Punch

6. OUTPUT MEDIA.

Paper Tape	Magnetic Tape

7. PRINTING DEVICES.

Multiple Punched Tape Printers
These printers can be the same units that are used for punching paper tape for input

*NOTE: **Magnetic Tape Units.** Total storage capacity over 8 million decimal digits, 5,300,000 alphabetic characters. With modifications up to 64 units may be used.

PART I:

What is Meant by Control?

CONTROL of a business may be defined as its regulation and direction towards determined objectives.

There are fundamental controls which any accounting system must be designed to facilitate, as the general activity of a business is vitally dependent upon information gleaned from its records.

An accounting procedure must present to management timely, accurate, complete information swiftly and economically. The success of mechanisation can be judged by the extent to which it achieves these requirements.

Mechanisation must assist the accounting procedure in production of statistical and allied information, to enable management to assess trends and results already achieved and thus confidently forecast development and expansion.

This statement is an analysis of the circumstances in which such managerial control may be increased by mechanised accounting. Later statements on the practical side will emphasise control to a greater extent rather than the application of particular machines to specific work.

PART II:

Why Mechanise?

MECHANISATION in some degree is present in every office, e.g. the use of a rubber stamp, a typewriter, a stapler, are all forms of mechanisation. The question is the extent to which mechanisation should be carried. This, naturally, will vary between the large and the small office.

The office has been aptly called a "paper work factory". Practically every clerical hour in the office is spent in processing paper work of some kind. All clerical work consists of writing figures from 0 to 9 or letters from A to Z and the results of all business operations are finally expressed in figures.

Figuring machines and writing machines are tools in the office in the same sense as the lathe and the drill are tools in the factory. The reason for mechanisation in the

office is, therefore, the same as the reason for mechanisation in the factory, i.e. to do more or better work with less effort, in less time, and at less cost.

In the attainment of these objectives the machine system should provide definite advantages over the manual system as, for example:

- Automatic addition, subtraction and computation of balances and accumulated control totals while posting;
- Production of records where the handling of cash is involved;
- Posting of transactions to two or more forms simultaneously;
- Provision of mechanical proof of the work;
- Recording of a large number of transactions more quickly and with a higher degree of accuracy;
- Translating the raw data of the transactions into a mechanical form which facilitates further processing and summarising;

Office mechanisation, properly applied, should result in the following overall benefits:

Improved clerical efficiency through:—Accuracy, Legibility, Speed, Ease of operation.

Aid to management by providing:— Economy, Convenience, Up-to-date information.

Protection of assets including:—Cash and stock, Customer accounts, Goodwill.

This is illustrated by the chart on page 4.

The aspects of "Cost" versus "Benefits" need to be very carefully studied, particularly as regards:—Annual depreciation on the equipment; Interest on the investment involved; Cost of labour in operation; Servicing of equipment; Stationery; Office space.

Benefits to be weighed against these costs may include:

Direct saving through utilisation of fewer staff,

Saving in interest on investment in sundry debtors through early collection of accounts.

Estimated value of benefits which should accrue (as enumerated above) but which cannot be measured directly in cash. (The potential benefit from additional aids

to management may be of greater importance than pounds saved.)

Another good reason for mechanisation is the difficulty in obtaining clerical efficiency with manual methods, e.g. errors in addition may lead to costly delays, loss of customers and profits. Also, illegible hand writing can result in annoyance and frustration, with resulting losses.

To sum up, it is probable that any business employing an office staff of two or more people would obtain advantages from some form of mechanisation. As the volume of work and the size of the staff increases, so should further application of mechanical methods be considered.

PART III:

The Objectives and Benefits of Mechanisation

ALTHOUGH for specific cases, the benefits of mechanisation may vary according to the type of equipment considered, i.e.:

Direct Accounting Machines (single or multiple purpose);

Punched Card;

Electronic Data Processing

the following general advantages, as compared to manual methods, will apply in each case:

Transcription (the writing of descriptions, reference numbers, dates and amounts), can be performed more quickly and more easily than by hand through the aid of special keyboards and such automatic features as date printing, tabulation and spacing;

Two or more records, or accounting results, can be produced from one transcription by the use of carbon or automatic machine controlled repeat printing, together with specially designed carriages and form feeding devices;

Addition and subtraction, and in some cases, multiplication and division, are automatic and mechanically accu-

rate by-products of transcription. Multiple total mechanism is provided so that the results of computation can be stored and printed as required for balances, analysis and control.

It should be mentioned also that while a machine, not being human, lacks the ability to act independently, it has the compensating advantages that it is never late, never asks for a rise, and works as hard and as well at the end of the day as at the beginning.

In seeking the best methods of handling an accounting system, these will be the normal objectives:

Information—for control and decision.

Timeliness—so that the information can be used to prevent loss and increase profit.

Protection over cash and records through increased accuracy and control.

Service that will preserve and create goodwill.

Convenience to reduce "peak loads", staff problems and the difficulties of reference.

Economy in time, space, stationery and equipment.

These form a yardstick by which to measure mechanisation against manual methods. (See chart on pages 14-15.)

A common requirement in commercial accounting is to produce from a basic record (e.g. an invoice):

Register of invoices and sales tax;

Customer's ledger;

Customer's statement;

Under the manual system this would normally require three separate steps, each involving two operations; (a) transcription and (b) computation (or checking).

Under the machine system it would be possible to reduce these **six** operations, each consuming time and presenting opportunity for error, to **one** of transcription, with computation as an automatic by-product.

If the three steps involved in the manual system require more than one person (as would generally be the case) then there would be additional benefits for mechanisation in the reduction of transportation, (the moving of media from one person to another) and co-ordination, and there would be a probable saving in space.

Comparing this simple example of manual and machine

methods under the heading of our yardstick, the benefits of mechanisation would be:

INFORMATION:

As is frequently the case, the information required is provided under both systems, but mechanisation would show its advantages in timeliness, accuracy, convenience and economy.

TIMELINESS:

Customer's statement and ledger (with account balances progressively machine computed and printed), together with the invoice and sales tax register, are produced simultaneously under the machine system and thus provides a degree of "up to dateness" usually not possible in manual methods. Information is readily available for credit control and reference.

PROTECTION:

Elimination of several manual copying and mental addition steps plus mechanical proof assures a degree of accuracy and protection difficult to achieve by manual methods.

SERVICE:

Neat machine printed statements and records that are up-to-date for query purposes, improve customer relations.

CONVENIENCE:

Simultaneous preparation of statement and ledger with mechanical proof of accuracy, reduces month-end peak loads in posting and balancing; up-to-date ledger records provide greater convenience in reference for customer query and credit control.

ECONOMY:

The machine system is more economical in man hours and probably there would be additional savings in space and stationery.

The benefits of mechanisation would vary according to the individual accounting problem under review, the volume of detail work and the information and degree of protection required.

PART IV:

The Preliminary Investigation

IT would be difficult to overemphasise the importance of making a thorough and skilful investigation of the work which it is proposed to mechanise. An adequate preliminary survey of the requirements and circumstances will enable more logical determinations to be reached. The fact that certain operations are capable of being mechanised is not, of itself, sufficient reason for mechanising them.

Time and thought applied at this stage of the survey will prove abundantly worthwhile, resulting in more effective plans of mechanisation, and provide the basis for a smoother transition to the new methods of operation.

It is a common experience to find that investigations of this type reveal unexpected opportunities for effecting improvements in existing methods and results. Not infrequently it is found that current procedures are not being carried out in the manner intended, with consequent waste of time, vitiation of the value of the data produced and the disappearance of internal controls on which management had been relying.

The survey should be planned to give a thorough understanding of the purposes of the procedures being studied, such as what ends it is designed to serve, its detailed methods, and the conditions affecting its performance.

The information and viewpoints to be gathered will be determined by the purpose of the investigation, but the following is a brief summary of the aspects which should be covered in a general survey aimed at disclosing every possibility of improvement in a particular routine:

Objectives of the Procedure:

The first essential is a clear and detailed understanding of the objectives of the procedure being studied. Possibly at this point the investigator runs the greatest risk of being superficial and overlooking vital facts. He should be sure that he is fully aware of *all* the objectives and requirements which the procedure must meet.

Organisation and Staff:

The next step is to set out the relationships and responsibilities of the various departments of the organisation

which are concerned in the carrying out of the routines being studied, or in the results of those routines.

Policies:

The procedure will have been established to carry out management's policies. A knowledge of these policies, so far as they relate to the particular procedure, forms part of the necessary background information for the designing of new methods.

The Present Procedure:

The existing methods should then be analysed into their detailed operations and the following information obtained for each operation:

What is done and in what sequence?

Who performs the operation and how is it performed? Equipment and aids used, and whether used to the best advantage.

What are the reasons for the operation?

A careful study of the purpose of each operation and of each document may prove to be a fruitful field of investigation—considering the tendency for unnecessary operations and forms to develop.

What volume of work is involved and how long does it take?

The investigator should take steps to obtain reliable information by means of test counts, etc. Estimates given by supervisors and those carrying out the operation are frequently misleading.

Does the work flow regularly?

If there are peaks and valleys, investigation should be made into their size, frequency and causes. In planning methods of mechanisation, peaks of work must be eliminated, or adequate equipment provided for handling the peak volumes.

Cost of Present Methods:

It is of course essential to know what the present methods are costing in order to have a basis for judging the worthwhileness of any proposed new methods. The present cost will include, in addition to labour, the cost of equipment, stationery and office space.

Effectiveness of Current Methods:

There should then follow a critical appraisal of the effectiveness with which the purposes of the procedures

A YARDSTICK FOR MECHANISATION

OBJECTIVE	FACTORS TO MEAS
INFORMATION To aid management For credit control For stock control For production control For financial control For better presentation, etc.	Its value compared to cost of productio Can it be produced as a by-product How often will it be used
TIMELINESS For prompt collections For discount taking To avoid overstocking To avoid lost orders To utilise funds to full	Value compared to cost Will executive (or personnel) be av ch earlier records Will bottlenecks or peaks be increased o
PROTECTION Over cash received Over payments Over stock Over charges Orders and records Through increased accuracy	Are shareholders funds sufficiently safegu Does the present system protect emp d customer, or does it invite temptation Is complete accuracy ensured Conversely is the cost of balancing its
SERVICE TO CUSTOMERS • In account presentation • In handling queries • In faster service (Applies particularly to remittance or instalment handling at counters)	Will the proposed system provide Better Equal Or worse service to our customers If worse, are there compensatory factors
CONVENIENCE In handling queries Reference Legibility and presentation Elimination of bottlenecks, overtime and casual staff Ease and simplicity of operation	Will the proposed system be better, equa r present system for Customers Staff Management
ECONOMY From indirect savings from above and In personnel In man hours In machines In space In stationery	Man hours saved cannot always be assess ngs unless they can be gainfully used Conversely a direct saving in personne le credited to mechanisation when it will to staff which would otherwise be inevita

ESTIMATE + OR — ANNUAL VALUE IN £s

Single Purpose m/c or job 1	Multiple duty machine			NOTES
	Job 2	Job 3	Job 4	
				It is not always possible to give + or — values in £s to information, timeliness, protection, service and convenience. However they become very important when the assessed economy is close to "breaking even" with the annual cost of the proposed system.
				ANNUAL COST OF PROPOSED SYSTEM Depreciation ..... Maintenance ..... Bank interest on outlay .....
				Total .....
				Compare

are fulfilled. Does each procedure produce the right information at the right time? Is the information produced made available to those who can effectively use it? Is the information accurate? Are the documents produced legible and complete? These questions are typical of lines of inquiry which may be followed.

PART V:

Work Flow Under Manual and Machine Methods

WORK flow is an important factor in the smooth running of any office system. Many existing manual systems would undoubtedly become more economical and efficient as a result of frequent examination of this aspect. But the need for such examination becomes more urgent and more profitable when machine methods are introduced.

For example, one operator with a suitable accounting machine for a certain accounting process may produce results which would have required the efforts of three persons under manual methods. This will not be true if the machine lies idle while the operator:—

Waits for data from another person or section;

Sorts invoices, heads-up new ledger cards or statements, searches for missing ledger cards, invoices, etc.;

Answers frequent queries as to ledger balances for credit control purposes, etc.;

Waits while another person uses the ledger.

Manufacturers of accounting machinery are always loth to guarantee outputs from their machines even when the calibre of the operator is known to them, because so much depends upon a factor which is generally beyond their control—the efficiency of the work flow.

If an accounting machine and operator can accomplish the results requiring three persons under manual methods, then delays and idle time due to inefficient work flow are three times more costly and inefficient in machine systems, than under manual methods.

To get the maximum benefit from the machine system, the work flow should be organised so as to provide a steady flow of media to the machine.

In this connection it is equally important to ensure that work flow which is satisfactory during the month does not fall down under month-end pressure. In far too many installations, operators receive and deal on a daily basis with a steady flow of invoices, receipts, etc., only to wait for many hours, and sometimes days, at the month-end for an invoice "subject to special pricing" or for journal entries which need an executive's decision.

The data, or posting media, should be legible and prechecked as far as possible to eliminate the need for operator's queries.

Media should be pre-sorted into ledger sequence and where necessary pre-determined balancing totals provided. Where volumes are high, less skilled or junior labour should be utilised to pre-select ledger cards. Interruption to the operator for state-of-account queries, etc., should be eliminated or reduced to a minimum.

PART VI:

Pitfalls to Avoid

IN general, pitfalls can be created through insufficient attention to exploratory surveys. From the viewpoint of control the following aspects must be given due attention:

1. The scope available for use of a machine must allow it to be sufficiently employed to justify its installation and running costs, when compared with costs of the existing system. Because an office routine can be mechanised is not in itself reason for change.
2. Effective information to management at reasonable cost may be more important than an overwhelming quantity of data which is not really needed.
3. Alternatively to (1), installation of a machine which only just copes with existing business might lead to substantial additional cost where a small increase in business necessitates additional equipment.

4. Machines cannot be expected to run at 100% capacity. The output calculation should be based on the average output of the operator, not on the maximum machine capacity. For instance, an adequate allowance must be made for setting-up time.

5. Adequate trained operatives must be available from the inception.

6. Staff partly or fully displaced must be dispensed with or usefully employed in other avenues to assist in obtaining maximum benefits.

7. If a machine concerns only a portion of the office routine its effect upon the remainder must be analysed and determined.

8. Should a study of (7) reveal bottlenecks, their solution must be found at reasonable cost.

9. In turn, the solution mentioned in (8) leads to consideration of related activities—say, production of essential statistics. These must be capable of proper completion in a new system.

10. Liaison between departments to see that equipment already available is being fully utilised and whether increased requirements could be covered by the proposed installation.

11. Office space saved by machine installations should be re-employed advantageously.

12. The effect of possible substantial changes in business activity should be taken into account at the time of machine installation.

13. If machines cannot be maintained by office or mechanical staff, adequate servicing arrangements must be made.

14. Unless all aspects are correctly assessed, cost results from new machines might prove to be wide of the mark, e.g., in calculating staff savings from mechanisation, do not include economies arising from other procedure improvements independent of that developed at the same time as mechanisation. The working life of a machine must be carefully estimated and depreciation taken into account.

PART VII:

Use of Charts and Office Manuals

THE small business may be able to rely on oral directions to govern its general office procedures, but a large office cannot be managed effectively without written instructions. Charts and office manuals become a necessity for efficiently carrying out accounting procedures by mechanisation.

The accounting officer in charge of mechanisation who co-ordinates manual and mechanised duties usually will be the best staff member to be made responsible for the compilation, control and revision of the manual.

The preparation of such an office manual requires the exhaustive investigation of procedures recommended under previous headings.

The manual is a summary of the quickest method of handling the work and should include charts showing the forms used, the stage at which manual and mechanised operations take place, the location from which details are fed into the machines, and the flow of completed details away from the machines.

When final details and charts are prepared prior to insertion into the office manual, they should be carefully studied and duplication avoided. The application of work simplification could be carried out with particular use of process flow charts, which should show every movement in getting ready, carrying out and completing an operation.

The office manual with charts allows for a continual control of procedures and provides a basis for endeavouring to improve performances. Constant attention must be given to the results achieved, weaknesses disclosed, and alterations indicated.

Improvements to the procedures contained in the office manual are constant, because additional experience gained in operation will disclose methods of improvement, short cuts, and additional advantages to be gained.

The office manual should comprise procedures which in their final form have been planned and established with such care that subsequent changes are kept to a minimum. But if changes are necessary, the manual should be altered at the time permission is given to change the procedure.

Office manuals mean a minimum of delay in training new staff or temporary operators.

Whilst a set plan is in operation any departure by an operator from the procedure can be rectified quickly, and unnecessary operations eliminated.

Further mechanisation of procedures may be planned more efficiently in an organisation where office manuals and charts are in existence and kept up-to-date.

Where office manuals with accompanying charts are not prepared it is difficult to obtain from clerks or operators a detailed, logical and sequential list of their duties. Important items may be overlooked and links between various sections of the work may be lost in the study of individual aspects.

PART VIII:

Staff

RAPID growth of industry and commerce in this country has resulted in a shortage of trained staff. In planning a programme of mechanisation of accounting duties the effect of this must be given careful examination.

Trained staff are needed to plan what work should go to the machines and how it should flow. This aspect is covered in other parts of these statements. Whatever is done need the direction and supervision of staff trained in the needs of the business, and in sound accounting principles.

Operators must be efficient. It is well to have others in training to fill permanent and temporary vacancies. Sometimes this is best achieved by having juniors doing some of the allied minor clerical work, such as selecting cards and heading them up ready for the operator. At the same time the juniors gain a rudimentary knowledge of the machines.

Business colleges are often able to assist in securing replacements, but a replacement from within the organisation saves additional training and delays. When operatives desiring full-time employment are scarce, it is possible sometimes to secure applicants for positions advertised as temporary or part-time.

Some organisations have male operators for their accounting machines and the tabulator section of their punch

card equipment. This has most merit where they are trained in accounting principles and can use their knowledge as an aid to production.

Where machines are applied to more advanced accounting than routine operations such as debtors' ledgers, creditors' recordings, and receipts and payments journals, operators are not the only problem. It may become necessary to have staff trained to interpret for management the production of the machines. With the greater capacity for production provided by machines, more information is being turned out. This could be a great help to management but by excessive volume it could become a hindrance. Management does not want a mass of figures presented without explanations and indications of trends.

Trained staff is required for interpreting the work coming from the machines and selecting and presenting information to management at various levels.

Such staff members need to be well grounded in basic principles and must keep abreast of modern ideas, both in the accounting field and the other aspects of their industry.

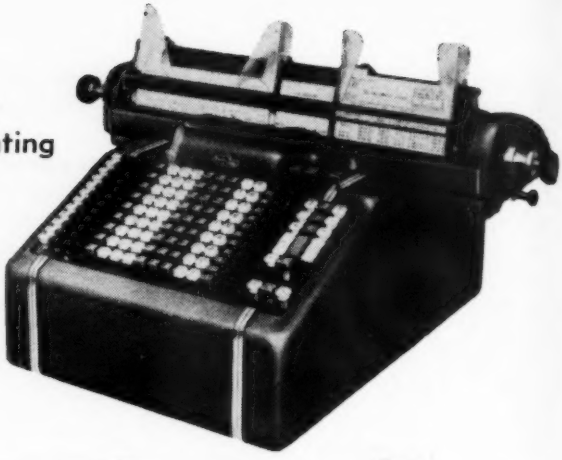
Where, under manual methods, staff absences may be overcome by other staff members working harder, or overtime, this is not so easy in the case of machine installations. When machines have taken the place of clerical staff, any time lost through breakdown can cause a serious bottleneck.

In a very large installation it may even be worthwhile to have a mechanic employed full-time to maintain machines at their greatest working capacity. This sometimes has proved of benefit in the case of large machine installations, having in mind the fact that as more and more work is placed on to machines, the greater the need to see that the full production programme is maintained to the due dates.

It is well to avoid the mistake of having a knowledge of machine routines and capacity confined to operators and those directly responsible. More senior people should be persuaded to learn sufficient of the procedures to be able to fully appreciate what can be achieved.

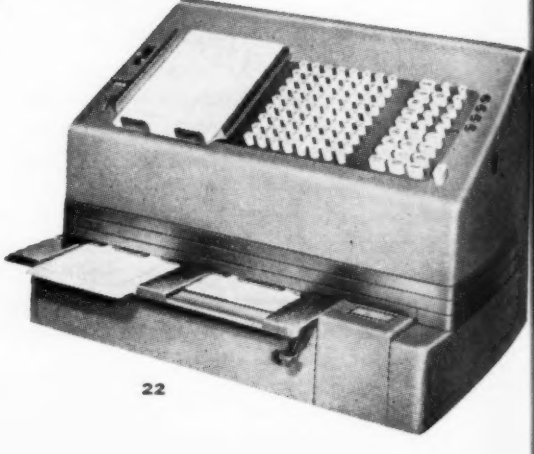
It is well to remember that no machine has been devised which does not require some human guidance. As more involved electronic machines are developed so the accountant is presented with a greater challenge to use his training and ingenuity to make the best use of their capacity.

Unit (or direct action) Accounting Machines Without Typewriter Keyboard.



Above:
Full keyboard accounting machine with date and character keys. Registers in-built according to specification.

Above:
Condensed keyboard accounting machine with date and character keys. Registers in-built according to specification.



At right:
"Front Office" accounting machine for counter recording, receipt issuing, posting and balancing.

PART IX:

Accounting Machine Equipment Available

To describe adequately the many types of accounting machines available would require far more space than can be provided in this series. In addition, the constant development of new features and new models by the various manufacturers means that descriptions of this nature can quickly become out-of-date and misleading. Apart from examining equipment being used by other organisations, literature published by manufacturers and suppliers provides the only source of detailed and current information regarding specific machines.

A brief outline of the basic characteristics of the different types of machines however, is essential to indicate the different forms of mechanisation.

In addition to the broad classifications of machines referred to below there are, of course, many office machines which can and do play important auxiliary roles in accounting routines, such as adding machines, desk calculators, front-feed typewriters, addressing equipment, copying machines and micro-filming equipment.

Accounting machines can be broadly classified into three groups, although such a classification cannot be completely satisfactory as certain machines can fall into more than one group. The three groups are:

Unit or direct action accounting machines,

Punched card machines, and

Electronic accounting or data processing machines.

Unit or Direct Action Accounting Machines:

These machines are keyboard operated and, while the entries or postings are being made on to records selected and inserted by the operator, the required addition and subtraction are performed by the machine. They also provide for the simultaneous production of two or more records, for example, a journal sheet, a customer's statement, and a ledger account. They may be subdivided into two general classes—single purpose machines and multiple purpose machines.

At left:
Full-keyboard accounting machine combined with typewriter keyboard, registers in-built according to specification.

Unit (or direct action) Accounting Machines With Typewriter Keyboard.

At right:
Electrified typewriter accounting machine with external registers added or removed as required.

At left:
Electrified typewriter accounting machine with external registers added or removed as required.

Single Purpose Machines:

Included in this group are certain machines designed and built for a single specialised accounting job, such as public utility billing machines, hotel guest account machines, and bank proof machines.

Also in this category are small ledger posting machines which are not fitted with facilities for change from one account ruling to another. (Most manufacturers are now producing small machines capable of ready change from one bookkeeping job to another, within the limitations of the carriage size, number of totals, and description writing facilities provided by the machine.)

Multiple Purpose Machines:

These include several makes, each with a number of models, of moving carriage accounting machines, both with or without a typewriter keyboard, and in each case, equipped with a readily changeable control panel or form bar so that the same machine can be adapted to a variety of different jobs.

Five different makes of accounting machines equipped with typewriter for descriptive purposes are currently available on the Australian market—these are Burroughs, Mercedes, National, Remington and Underwood.

Accounting machines without typewriter keyboard, using instead symbols or numbers for description and reference purposes, are available from three manufacturers—Burroughs, National and Underwood.

The various makes of machines differ considerably in keyboard arrangements, availability and method of total selection, carriage sizes, and the degree of automatic performance.

Punched Card Machines:

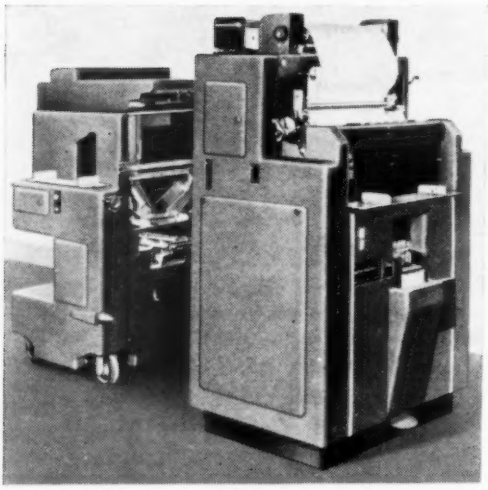
The basic machines involved in punched card forms of mechanisation are:

Punches, used to produce the punched cards which operate the other machines. Each card contains, in punched hole code, all the required data relative to one transaction.

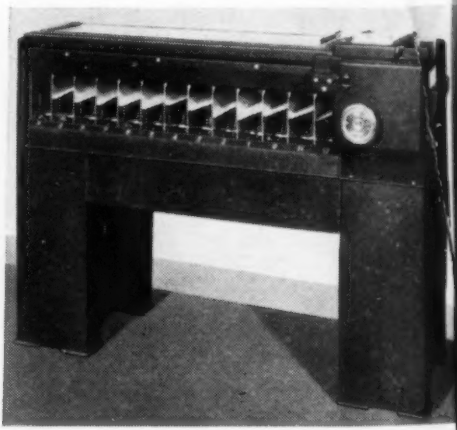
Sorters, which mechanically arrange the cards in the sequence or groups necessary for the particular records or summation to be produced, and

Punched Card Machines.

At right: Automatic key punch which punches holes in cards to record original data.



At left: Tabulator and summary card punch. Standing 5 feet 7 inches high the tabulator handles 100 punched cards per minute and gives a complete printed record of the information carried on the cards. The summary card punch machine (in rear) provides final summaries from the tabulated results.



At right: High speed punched card sorter. It sorts one column for each passage of the cards through the machine at the rate of 660 cards per minute.

Tabulators, through which the cards are run to print and total the required lists, accounts and documents.

Among the auxiliary machines available are:

Reproducing punches, which copy data from one pack of cards on to another.

Mark sensing punches, which punch holes in accordance with pencil markings on the cards.

Summary card punches, to automatically punch cards for each total or balance produced by the tabulator.

Verifiers, for checking the accuracy of the work of the punch operators.

Collators or interpolators, for interpolating one pack of cards with another.

Interpreters, which print on a card the information punched in it.

Calculating punches, which can cross-add or subtract, or multiply factors punched in the cards and punch the results. Hollerith, I.B.M. and Powers-Samas types of punched card equipment are currently available in Australia.

Electronic Data Processing Equipment:

The last few years have seen the creation or rapid development of accounting, or data processing machines, based on the techniques used in the electronic computers, often referred to as "giant brains," which scientists have created for the solution of mathematical problems.

All the manufacturers of punched card equipment, most of the manufacturers of bookkeeping and calculating machines, and some other companies previously not connected with the production of office machines, are active in this new field of accounting equipment.

These machines operate at speeds which, but a short while ago, would have been considered fantastic, and, in many cases, carry out a number of processes in a single run of the data.

Briefly the electronic data processing system can provide:

Input from a keyboard or from punched cards, punched paper tape or magnetic tape or other appropriate means, created in many instances as a by-product of making the original record (e.g., by electric typewriter, adding machine, accounting machine or cash register).

Processing through an electronic data processor (or computer) equipped with:

An inbuilt "memory" or temporary storage unit, usually in the form of a magnetic drum or magnetic core. This stores the programme instructions (followed automatically), the new data, old or other data "brought forward" from the permanent file and the new results.

An auxiliary "memory" (the permanent file) usually in either magnetic tape form or punched cards.

An arithmetical unit which adds, subtracts, multiplies and divides at speeds measured in thousandths of a second.

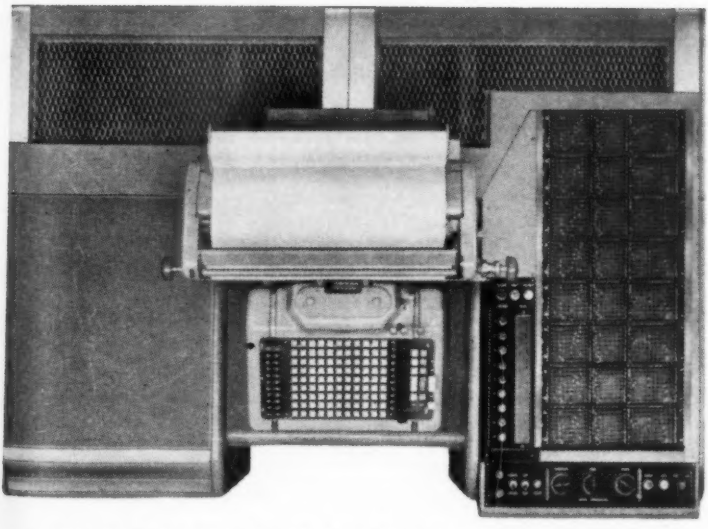
A control unit which directs operations from the stored "programme" for completely automatic processing from "input" to "output".

Output through "slave" printers operated either directly by the electronic computer or from information in punched cards, punched paper tape or magnetic tape, punched or magnetised by the computer.

The next statement will cover the form of control provided by machine accounting as applied to specific applications, such as revenue accounting and expenditure accounting.

Operator using the controls of the electric desk computer shown in the bird's-eye view on facing page.

At right: Electric multiplying punch, measuring 4 feet long, 2 feet wide by 5 feet high, punches results in cards and checks answers. Examples of capacity: A (99999.99) x B (£999. 19. 11.999) = C (£999999. 19. 11.999); multiplication with cross addition or subtraction; and cross addition or subtraction.



Electric desk-size computer designed to solve problems too complex for efficient solution by desk calculators, yet too small for economical solution on giant electric "brain" machines. The electronic arithmetic unit is on the left of the keyboard, and on the right are the operator controls and pinboard programme.

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